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APPLICANT(S):	BEN-AMOTZ, Ori	EXAMINER:	POPOVICS, Robert J.
SERIAL NO.:	10/734,119	GROUP ART UNIT:	1724
FILED:	December 15, 2003	ATTORNEY DOCKET No.:	P-5616-US

FOR: DEVICE, SYSTEM AND METHOD FOR GRAY WATER RECYCLING

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Applicant(s) hereby submits a certified copy of the Israeli Application No. 154644 filed February 27, 2003 for the above identified patent application.

Respectfully submitted,

Guy Yonay
Attorney for Applicants
Registration No. 52,388

Dated: March 16, 2005

Pearl Cohen Zedek Latzer LLP.
10 Rockefeller Plaza, Suite 1001
New York, New York 10020
Tel: (212) 632-3480
Fax: (212) 632-3490

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PATENTS LAW, 5727 - 1967

בקשה לפטנט - Application For Patent

לשימוש הלשכה
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מספר: Number	154644
תאריך: Date	
הוקדם/נדחה Ante/Post-dated	27-02-2003

אני, (שם המבקש, מענו ולגבי גוף מאוגד - מקום התאגדותו)
I, (Name and address of applicant, and in case of body corporate - place of incorporation)

WATERGATE LTD
9 Tor St.
Caesarea 38900

Israeli Company

ווטרגייט בע"מ
רח' תור 9
קיסריה 38900

חברה ישראלית

Inventor: **Ori Ben-Amotz**

ממציא: אורי בן-אמוץ

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מערכת למחזור מים אפורים

(בעברית)
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GRAY WATER RECYCLING SYSTEM

(באנגלית)
(English)

*בקשת חלוקה - Application of Division	*בקשת פטנט מוסף - Application for Patent Addition	דרישה דין קדימה Priority Claim		
*מבקשת פטנט from Application	*לבקשה/לפטנט to Patent/Appl.	מספר\סימן Number/Mark	תאריך Date	מדינת האגוד Convention Country
מס' No.....	מס' No.....			
מיום dated.....	מיום dated.....			

יפוי-כח: **כללי / רצוף בזה**
POA: **general/attached**

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עורכי דין, עורכי פטנטים ונוטריון
רח' שנקר 7, הרצליה 46725

היום 27 לחודש פברואר שנת 2003
This 27 of February of the year 2003

Signature of the Applicant חתימת המבקש

For the Applicant, עבור המבקש,

איתן, פרל, לצר וכהן-צדק
EITAN, PEARL, LATZER & COHEN-ZEDEK
P-5616-IL

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GRAY WATER RECYCLING SYSTEM

מערכת למחזור מים אפורים

Eitan, Pearl, Latzer & Cohen-Zedek

P-5616-IL

APPLICATION FOR PATENT

Inventor: Ori Ben-Amotz

Title: Gray Water Recycling System

FIELD OF THE INVENTION

The present invention relates generally to the field of water recycling, and more particularly to a low pressure recycling system and method for recycling water from selected gray water sources.

BACKGROUND OF THE INVENTION

Water saving methods generally focus on reducing usage of fresh water supplies. It has been estimated that the flushing of toilets (creating black water) constitutes between 38 to 45% of all interior domestic water usage (fresh water) in the USA and 40% in Israel. That is, nearly half the fresh water usage in the US, which turns fresh water into black water, is accounted for by flushing toilets.

Gray water is defined as water that contains some level of impurity lower than that of black water. It is estimated that between 42% to 79% of gray water comes from bathtubs and showers, and 5% to 23% from laundry facilities (*The Humanure Handbook. Jenkins Publishing, PO Box 607, Grove City, PA 16127, see chapter 9).* Many attempts have been made, over the last few decades, to provide solutions to reduce fresh water usage by flushing toilets, laundry facilities and bathtubs.

Water saving attempts can generally be put into three categories: water collecting, water usage reduction, and water re-cycling. Although there have been numerous improvements in all three categories, and despite the fact

that water saving measures have been mandated through legislation in various countries, a lack of fresh water in large portions of the world is still a major problem. There is a constant need for additional improvements in the way that human communities utilize their fresh water supplies.

Some water-recycling measures have included enabling irrigation of home gardens using gray water, which may be defined as non-toilet wastewater produced in an household including the water from bathtubs, showers, sinks, washing machines, and dishwashers. Treated sewage (toilet) water may also be defined as gray water. Gray water usage has typically been implemented by collecting such water in buckets or alternative water collection reservoirs, and transferring the water to a final destination via channels that are not used for fresh water.

More recent methods of water conservation have been implemented using water purification systems, which provide complete water treatment of grey and black water, including the water coming from the toilets. These methods, however, are very expensive, complex to implement and maintain, and require the usage and storage of hazardous chemicals.

Attempts to implement gray water solutions have not been successful in penetrating the mass market. Some of the obstacles to the adoption of gray water saving systems have included: (1) prohibitive costs in setting up these systems, (2) bad odors or fumes from the water, (3) low water pressure, (4) contamination of the places being irrigated and of fresh water sources due to bacteria associated with still gray water, (5) drainage problems and (6) safety issues such as preventing the consumption of such recycled water.

It would be highly advantageous to have a system and method that enables a simple, easy to implement gray water recycling system that is safe, effective and aesthetic.

SUMMARY OF THE INVENTION

According to some embodiments of the present invention, there is provided a water recycling solution for gray water. According to some embodiments of the present invention, upper and lower water tanks may be placed at high and low points, respectively, of a building or residence. Low-pressure piping and valves may be incorporated to enable efficient low-pressure water flow throughout the system. In addition, according to some embodiments of the present invention, mechanical filters and/or traps may be utilized to prevent clogging and reduce contaminants within the gray water utilized.

As part of a gray water recycling system according to some embodiments of the present invention, there may be a separation between a building's or residence's gray water flushing system and its existing fresh water plumbing system. Gray water sources can be selected by the user, such that the gray water from selected sources, being relatively "clean" gray water, freely flows to a collection point, is pumped to an expansion tank, and flows into toilet flush tanks or other water targets upon demand. Gray water may flow from a collection point, which is at a relatively high point, to gray water targets, at relatively lower points, using gravity.

There may be provided, in accordance with at least one embodiment of the present invention, a fresh water backup system for ensuring constant water flow into the system. The fresh water backup system may be provided with a one-way valve, for preventing flow of gray water into fresh water source.

There may be provided, in accordance with at least one embodiment of the present invention, a system and method for adding colorants, detergents,

decontaminants, purifiers, vapors, and any other additives to the gray water, for further improving the gray water quality, and/or differentiating the gray water from other water supplies.

There may also be provided, in accordance with at least one embodiment of the present invention, a means for selecting or determining particular water targets in a domestic plumbing system.

There may also be provided, in accordance with at least one embodiment of the present invention, a means for eliminating the hot-water surge phenomenon, by extracting the flush toilets from the remainder of the building plumbing system.

There may further be provided, in accordance with at least one embodiment of the present invention, a means for limiting the damage caused by high-pressure pipes that connect to toilets in typical plumbing systems, by installing low-pressure pipes and valves in the toilet plumbing system.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be understood and appreciated more fully from the following detailed description taken in conjunction with the appended drawings, it being understood that these drawings are given for illustrative purposes only and are not meant to be limiting, in which:

Fig. 1 is a diagram illustrating the components of a gray water recycling system, according to at least one embodiment of the present invention;

Fig. 2 is a diagram illustrating the components of a lower tank (collection tank), according to at least one embodiment of the present invention;

Fig. 3 is a diagram illustrating the components of an upper tank (expansion tank), according to at least one embodiment of the present invention;

Fig. 4 is a diagram illustrating flush tank components according to at least one embodiment of the present invention;

Fig. 5 is a diagram that illustrates steps performed according to at least one process of the present invention.

It will be appreciated that for simplicity and clarity of illustration, elements shown in the figures have not necessarily been drawn to scale. For example, the dimensions of some of the elements may be exaggerated relative to other elements for clarity. Further, where considered appropriate, reference numerals may be repeated among the figures to indicate corresponding or analogous elements.

DETAILED DESCRIPTION OF THE PRESENT INVENTION

The following description is presented to enable one of ordinary skill in the art to make and use the invention as provided in the context of a particular application and its requirements. Various modifications to the described embodiments will be apparent to those with skill in the art, and the general principles defined herein may be applied to other embodiments. Therefore, the present invention is not intended to be limited to the particular embodiments shown and described, but is to be accorded the widest scope consistent with the principles and novel features herein disclosed.

In the following detailed description, numerous specific details are set forth in order to provide a thorough understanding of the present invention. However, it will be understood by those skilled in the art that the present invention may be practiced without these specific details. In other instances, well-known methods, procedures and components have not been described in detail so as not to obscure the present invention.

Specifically, reference is now made to **Fig. 1**, which is an illustration of the components of the water recycling system according to some embodiments of the present invention, as viewed according to a typical implementation in a home or building. An implementation of the water recycling system can be executed in any apartment, house, commercial unit, hotel, office block, community facility or any other building with a plumbing system, hereinafter referred to as "building" **10**. A lower tank, hereinafter referred to as a collection tank **11** may be placed located below the lowest level (altitude) of habitable or otherwise usable space, such that water from at least one selected gray-water source **12** may flow by gravity to the collection tank **11**. A gray water source

may be selected from any water using appliance or facility that provides substantially unpolluted water, including but not limited to baths, showers, wash basins, sinks, washing machines, dish washers and the like. An expansion tank **15** may be placed at the highest utilized (for water usage purposes) level of the building **10**, such that water that has been collected from the collection tank **11** may be pumped to the expansion tank **15**, and subsequently flow by the force of gravity to the toilet **18** or alternative recycled water destination. The size of the tanks may be designed such that a water or sump pump, located either in the collection tank **11** or external to the collection tank **11** reaches a low point of the collection tank **11**, thereby ensuring that water above a low water point in the tank can be pumped to the expansion tank when the pump is activated. The Expansion Tank **15** capacity may typically be designed to provide approximately one day's water usage for the building **10** being fitted with the system. These tank sizes may provide high water circulation from both tanks, such that the gray water need not stay much longer than a day, or any other determined time limit, in the system. In addition, in the case where a user is expecting to be away from the building **10** for some time, and does not want the gray water to sit for all this time, the user may manually activate the pump located in the collection tank **11** so as to ensure that water above the low water level in the collection tank **11** is pumped to the expansion tank **15**. The user must subsequently ensure that all water in the expansion tank **15** is used up before taking absence from the building **10**. In addition, it may be necessary to open the drain valve, thereby enabling the lowest level of the tank contents to be emptied. This lowest level in the tank is typically filled, in addition to gray water, with lint, hair, debris, mud, slush, mire, muck, slime, sludge and the like.

The components of the collection tank **11** can be seen with reference to **Fig. 2**, which illustrates the collection tank **20** according to at least one embodiment of the present invention. A pipe (incoming pipe) **21** may be set up to transport gray water from a selected gray-water source to the collection tank **20**, using the force of gravity. A dispenser **22** may be connected to the collection tank **20** to enable adding of elements to the water for the purposes of disinfecting, decontaminating, de-chlorinating, providing pleasant smells, pleasant aesthetics, water safety standards etc. For example, a blue coloring agent may be inserted into the water to provide pleasant smells and coloring for the water. An additional benefit of such colored water may be to enable user differentiation of recycled water, thereby minimizing the risks of user's drinking non-drinkable gray water. An overflow outlet **23** may be integrated into the collection tank **20**, for enabling excess water to flow out of the collection tank **20** when required. This overflow outlet **23** may be used to transport excess gray water to the black water system, or to alternative water targets, such as a garden. A water pump or sump pump **24**, that may be mechanical or electrical, may be provided to pump up the collected gray water from the collection tank **20** to the expansion tank **15**. The water pump **24** may be placed inside the collection tank **20**, as can be seen in Fig. 2, or external to the collection tank **20** (not seen in Figure). External pumps may typically be used for higher capacity pumps, such as tanks designed for larger and/or higher buildings. In the case where the pump **24** is external to the collection tank **20**, a pipe is provided through which water may be drawn from the collection tank **20** to the pump **24**. A pipe (outgoing pipe) **25** may be fitted to the pump **24**, for transporting the gray

water being pumped up to the expansion tank **15**. A non-return valve **26** may be placed in the outgoing pipe **25**, thereby preventing the return of water from the expansion tank **15** or outgoing pipe **25** to the collection tank **20**. A water level sensor is provided, connected by a mechanical indicator **27** to the pump **24**, such that when the indicator **27** reaches a determined "high" level (H) of water in the tank **20**, the pump **24** may be triggered and the water may be pumped to the expansion tank, until the low water level (L) is reached inside the collection tank **20**. A low level of water may be maintained in the tank **20** as larger debris and other unwanted elements in the gray water will generally be found in the lower levels of the water, such as the level represented by the low level of the water level sensor. In this way, the unwanted larger particles in the gray water will not be pumped into the expansion tank. In addition, the pump may require a minimum level of water in the collection tank **20** so as not to draw in air and be at greater risk of motor burn out. A drain valve **28** may be provided at the lower portion of the collection tank **20**, for enabling the release of the lowest or bottom level of the collected water, which typically contains the larger particles and unwanted elements in the collected gray water, including lint, hair, debris, mud, slush, mire, muck, slime, sludge and the like. A mechanical filter **29** and/or trap may be fitted to the incoming water pipe **21** and/or the outgoing water pipe **25**, to filter out or otherwise withhold unwanted elements from the gray water.

According to a typical implementation of the present invention, thick pipes (such as two inch pipes) may be used for the incoming **21** and outgoing **25** pipes. Medium thickness pipes (such as one-inch pipes) may be used for the dispenser **22** and overflow outlet **23** pipes. It should be noted that the

various sizes, capacities and/or strengths of the various components in the water recycling system, including the tanks, pipes, pump, valves, dispenser, filters etc., may be integrated into the present recycling system, according to the system requirements, and typically as a function of supply and demand for gray water in the building **10**. These various possible configurations of the various components may be changed according to the needs and designs of a particular gray water recycling system being implemented.

The components of the expansion tank **15** can be seen with reference to **Fig. 3**, which illustrates the expansion tank **30** according to at least one embodiment of the present invention. The outgoing pipe **25** from the collection tank **20** enters into the expansion tank **30**. A filter or trap **394**, for filtering out or otherwise withholding larger particles from the gray water, may be connected to outgoing pipe **25** . An overflow outlet pipe **31** may be placed in the upper area of the expansion tank **30**, for enabling excess water to flow out of the expansion tank, when a determined water level has been reached, or when otherwise necessary. This overflow outlet **31** may be used to transport excess gray water to the black water system or to alternative water targets, such as gardens or for cleaning purposes. An additional pipe **32** may be provided to supply fresh water to the expansion tank **30**, when needed. For example, if there is an inflated demand on the gray water supply within the expansion tank **30**, fresh water supplies can be tapped to supplement the water quantity in the expansion tank **30**. A non-return valve **33** may be placed in the fresh water pipe **32**, for preventing the flow of gray water through the fresh water pipe **33** and/or to a fresh water source that supplies fresh water to the fresh water pipe **33**. A shut-off valve and float **34** may be provided in the expansion tank **30**, to measure the

water level in the expansion tank **30**, and control the flow of fresh water from the fresh water inlet **32**. In this way, if the water level is below a pre-determined level (the minimum water level **35**), the fresh water pipe **32** may be opened, and fresh water may flow into the tank from the fresh water pipe **33**. When the water level is at or above a determined water level (the minimum water level **35**), the float **34** may close the fresh water pipe **32** and no more fresh water may flow into the tank **30**. At least one outgoing pipe **36** may be attached to the expansion tank **30**, for transporting gray water to determined water targets (flush toilets **18** etc.). In the case where a plurality of water targets are set up to receive gray water, each water target may be connected by a pipe **37** to the outgoing pipe **36**. A shut-off valve **38** may be added to the outgoing pipe **36**, to turn off the water supply from the expansion tank **30** to the water targets. A dispenser **39** may be connected to the expansion tank **30** to enable adding of elements to the gray water in the expansion tank **30** for the purposes of disinfecting, decontaminating, providing pleasant smells, pleasant aesthetics, water safety standards etc. A drain valve **392** may be provided at a lower portion of the expansion tank **30**, for enabling the release of the collected water and debris etc. found in the lower reaches of the tank **30**. A mechanical filter **394** and/or trap may be fitted to the outgoing water pipe **36**, to filter out or otherwise withhold unwanted elements from the gray water, such as hair, lint, debris and the like.

According to a typical implementation of the present invention, large pipes (such as two inch pipes) may be used for the incoming **25** and outgoing **36** pipes as well as the fresh water pipe **33**. Medium thickness pipes (such as one-inch pipes) may be used for the dispenser **39** and overflow outlet **31** pipes.

Slightly narrower pipes (such as ¾ Inch pipes) may be used for the pipes **37** connecting the outgoing pipe **36** to the water targets. It should be noted that the various sizes, capacities and/or strengths of the various components in the water recycling system, including the tanks, pipes, pump, valves, dispenser, filters etc., according to the present invention, may be integrated into the system, according to the system requirements, and typically as a function of supply and demand for gray water in the building **10**. These various possible configurations of the various components may be changed according to the needs and designs of a particular gray water recycling system being implemented.

Typical pipes that are configured for each water target (such as a flush tank toilet) are approximately 3/8 - ½ inch pipes. These pipes are designed to supply gray water from the expansion tank to the water targets at low pressure, where they typically flow into significantly smaller pipes and valves, increasing the water pressure as the water is forced through these small channels into the flush tank. In the case where the gray water recycling system, according to at least one embodiment of the present invention, recycles gray water for use in flush toilets, the gray water remains at low pressure even when entering into the flush tank, using widened pipes and valves that may be designed to substantially similar specifications as the incoming pipes.

Fig. 4 illustrates at least one embodiment of piping, connectors and valves at the entry point of the flush tank, hereinafter referred to as the "supply valve". Each of the elements that provide the connection between the inlet pipe **41** and the flush tank, and in particular the connection to the flush tank water outlet **47** are characterized in having substantially similar internal thicknesses to

the pipes which bring the gray water into the flush toilets or alternative water targets. These low-pressure components thereby enable the water to flow into the flush tank **40** at low pressure, but at a substantial rate. In this way, the gray water from the expansion tank **30** may flow under the force of gravity into the flush tank **40**, without being restricted to the typical high-pressure valves entering such tanks. Such gravity enabled water flow may enable rapid, and relatively silent, flush tank filling, causing fewer incidences of water pressure damage to the piping apparatus. The filling of such a tank may typically be completed, for example, within 1-2 minutes, depending on various factors, such as the height of the expansion tank **30**.

According to an embodiment, for example, a pipe **41** (for example a ½ inch pipe etc.) may transport water from the expansion tank **30** to the flush tank **40**. A low pressure valve, with a substantially similar thickness to the inlet pipe **41** (for example ½ inch etc.), may be placed within a valve housing **45**, which may connect the inlet pipe **41** to the flush tank float **48** using low pressure connectors **44, 46**. These low-pressure connectors may have a substantially similar thickness to the inch inlet pipe **41** (for example ½ inch etc.). This low-pressure piping apparatus, which may include at least the inlet pipe, connectors, valve etc. may enable water to flow at a substantially constant pressure or rate from an upper collection tank through to a selected water target, such as a flush tank etc.

It should be noted that the various sizes, capacities and/or strengths of the various components in the water recycling system, including the tanks, pipes, pump, valves, dispenser, filters etc., according to the present invention, may be determined according to the supply and demand for gray water in the

building **10**. These various possible configurations of the various components may be changed according to the needs and designs of a particular gray water recycling system being implemented.

Fig. 5 is a flowchart that illustrates an example of how the system typically operates, according to at least one embodiment of the present invention. As can be seen in the figure, gray water sources may be selected by the users **505**. Selected sources for recycling may be pre-plumbed and/or retrofitted **510** in existing buildings, to provide a flow of water, using gravity, into the Collection Tank **20**. Rain catchments may also feed into the system, entering into either of the tanks through at least one determined point. After setting up the collection tank **20** and relevant plumbing the gray water from the selected source(s) **12** flows **515** into the collection tank **20**. The incoming water may pass through a mechanical filter **29** and/or trap before entering the collection tank **20**, thereby being filtered **520**. An additive, such as a pleasant smelling Blue Coloring agent may be added **525** to the water, by a Dispenser **22**. When the water reaches a determined high point in the tank, as detected by the water level sensor **27**, the pump **24** may be activated to pump the water **530** upward to the Expansion Tank **30**. In the case where too much gray water **535** is in the collection tank **20**, for any reason or because of any technical problem, excess water may be transferred **540** to an alternative water target via the overflow outlet **23**. Alternatively water (together with lint, hair, debris, mud, slush, mire, muck, slime, sludge and the like) may be released from the collection tank using the drain valve **28**.

The water may flow through a filter **550** or trap before entering the expansion tank **30**. When the water reaches the Expansion Tank **30**, it is stored

555 in the tank **30** until at least one of the water targets **18** are at least partially emptied, at which time water may be released **560** from the expansion tank **30** to the emptied or partially emptied water target(s) **18** using the force of gravity.

Additives may be dispensed **565** into the water in the tank **30**. In the case where there is not enough gray water **570** in the tank **30**, as determined by the shut-off valve and float **34**, such as in the case where the demand for the water is greater than the supply, the fresh water inlet may be opened to enable the adding of fresh water into the expansion tank, until at least the minimum level **35** is reached.

In the case where too much gray water **585** is in the collection tank **30**, for any reason or because of any technical problem, excess water may be transferred to an alternative water target **590** via the overflow outlet **23**. At any time, water (together with lint, hair, debris, mud, slush, mire, muck, slime, sludge and the like) may also be released **595** from the collection tank using the drain valve **28**.

At the connection point, referred to herein as supply valves, for each water target **18**, such as flush tanks, low pressure valves **42**, valve housing **45** and connectors **44, 46** (with diameters that are substantially similar in thickness to inlet pipes), are fitted that allow the water to flow to the Flush Tank **40** without a reduction in the pipe size (such as $^{3}/_{8}$" or ½", depending on the type of Flush Tank type). Incoming gray water passes through this flush tank entry point and enters the flush tank **40** through the low pressure water outlet **47**, at low-pressure and by force of gravity. This low-pressure high performance water flow prevents clogging of the various pipes leading into the flush tank **40**, by threads, hair, detergents and the like (due to the wide piping), and enables fast filling of

flush tanks and the like. The float mechanism **48** is substantially similar to the currently used flush toilet floats. All the pipes from the Expansion Tank **30** to the Flush Tank **40**, as well as all the water targets **18** in the recycling system, may be filled with the Gray Water at any time and may be ready for use.

In the case where the demand is greater than the supply of Gray Water from the expansion tank **30**, the level of the water in the Expansion Tank **30** may drop under a minimal level defined **35**. At this point, the shut-off valve and float **34** may be in a low position relative to the inlet pipe **32**, thereby opening up the fresh water inlet pipe **32**. Fresh water is thereby enabled to flow into the expansion tank **30**, from a fresh water source, until a determined, or minimum water level **35** has been reached. At this minimum water level **35** the shut-off valve and float **34** may be positioned in a flat position relative to the inlet pipe **32**, thereby closing off the fresh water inlet **32** and shutting off the incoming fresh water supply. The fresh water inlet pipe **32** provides a back-up mechanism for the recycling system, and provides a way to ensure a continual supply of water for the water targets. The fresh water inlet pipe **32** may also enable continual usage of the water recycling system with fresh water only, without any Gray Water (in the case where the user disconnects the gray water supply or the pump etc.), if desired at any time for whatever reason.

In the case of greater supply of than demand for gray water, or technical problems such as a pump problem or a power problem, where the water level in either the collection **20** or the expansion **30** tank rises above a determined high level, the excess water may exit either or both of the tanks through the overflow pipes **23, 31**. From the overflow pipes **23, 31** the water

may irrigate the garden, be spilled into the sewage system, or be directed to any alternative destination.

There is also provided, in accordance with at least one embodiment of the present invention, a means for eliminating a hot-water surge phenomenon wherein a user of a shower or bath may experience a hot water gush when another person flushes a connected toilet. This may be caused by the high-pressure water requirement for the cold water to refill the flush tank, leaving the shower or bath with relatively little cold water, and therefore a substantially hotter temperature of the running water. By extracting the flush toilets from the remainder of the building plumbing system, according to the present invention, the above-described elimination of the hot surge phenomenon may be prevented.

There is also provided, in accordance with at least one embodiment of the present invention, a means for limiting the damage caused by high-pressure pipes that connect to toilets in typical plumbing systems, by installing low-pressure pipes and valves in the toilet plumbing system. The high-pressure rush of water that typically refills flush tanks after flushing often causes harm to the hoses, valves, floats and pipes. According to the present invention, the low-pressure water flow into the flush tanks, enabled by the piping and valves designed for low-pressure flow, prevents many of these damages from occurring.

The foregoing description of the embodiments of the invention has been presented for the purposes of illustration and description. It will be appreciated that the present invention is not limited by what has been described hereinabove and that numerous modifications, all of which fall within the scope

of the present invention, exist. For example, while the present invention has been described with respect to a single building, the scope of the present invention includes the setting up of a system for a compound of buildings.

It will be appreciated by persons skilled in the art that the present invention is not limited by what has been particularly shown and described herein above. Rather the scope of the invention is defined by the claims that follow:

CLAIMS

What is claimed:

1. A gray-water recycling system comprising:

   a lower tank for collecting gray water from at least one selected gray water source, said lower tank being placed at a lower altitude than said at least one selected gray water source;

   an upper tank for storing collected gray water at a higher altitude than at least one water target connected to the system;

   a pump for pumping collected gray water in said lower tank to said upper tank; and

   piping for enabling water flow from said upper tank to said at least one water target.

2. The system of claim 1, further comprising at least one one-way valve for preventing said gray water in said upper tank from returning to said gray water in said lower tank.

3. The system of claim 1, further comprising a low pressure supply valve for connecting piping from said upper tank to said at least one water target, such that water pressure in said piping and in said supply valve is substantially unchanged.

4. The system in claim 1, further comprising at least one dispenser for dispensing at least one additive into collected gray water.

5. The system in claim 1, further comprising at least one filtering mechanism selected from the group consisting of filters and traps.

6. The system of claim 5, wherein said filtering mechanism filters collected gray water at at least one stage selected from the group consisting of: upon entering into said lower tank, upon being transferred from said lower tank to said upper tank, and upon being transferred from said upper tank to said water target.
7. The system in claim 1, further comprising at least one overflow outlet, for discharging and/or distributing excess gray water from said lower tank.
8. The system in claim 1, further comprising at least one overflow outlet for discharging and/or distributing excess gray water from said upper tank.
9. The system in claim 1, further comprising at least one drain valve for discharging excess content from said lower tank.
10. The system in claim 1, further comprising at least one drain valve for discharging excess content from said upper tank.
11. The system in claim 1, further comprising a water backup mechanism for ensuring constant flow of water into the system, said water backup mechanism including a fresh water inlet into said upper tank.
12. The system of claim 11, wherein said water backup mechanism further comprises at least one one-way valve in said fresh water inlet for preventing collected gray water from flowing through said fresh water inlet.
13. The system of claim 11, wherein said water backup mechanism further comprises a shut-off valve and float for determining

when at least a minimum water level has been reached in said upper tank.

14. The system of claim 13, wherein said water backup mechanism further initiates a fresh water flow into said upper tank when a selected water level has been breached in said upper tank.

15. The system of claim 14, wherein said water backup mechanism further closes off said fresh water flow when at least said minimum water level has at least been reached in said upper tank.

16. The system in claim 1, further comprising a shut-off valve to close off a flow of water from said upper tank to said at least one water target.

17. The system of claim 1, wherein said at least one water target is at least one target selected from the group consisting of flush tanks, gardens, fields, drainage systems, cleaning apparatus, and black water apparatus.

18. A method for recycling gray water comprising:

i. connecting at least one selected source to at least one lower tank, said lower tank being situated at an altitude lower than said at least one selected source;

ii. collecting gray water from at least one selected source in said lower tank;

iii. setting up at least one upper tank connected to said lower tank, and connecting said upper tank to at least

one water target, said upper tank being situated at an altitude higher than said at least one water target;

iv. transferring gray water collected in said lower tank to said upper tank; and

v. when said water target requires a water supply, releasing gray water from said upper tank to said at least one water target.

19. The method of claim 18, further comprising providing a dispenser to dispense at least one additive to said collected gray water.

20. The method of claim 18, further comprising providing an overflow outlet to said lower tank, to enable discharging and/or distribution of excess water from said lower tank.

21. The method of claim 18, further comprising providing an overflow outlet to said upper tank, to enable discharging and/or distribution of excess water from said upper tank.

22. The method of claim 18, wherein at least one filtering mechanism selected from the group consisting of a filter and a trap is provided, to filter out undesired elements from water from said at least one selected source before said water flows into said lower tank.

23. The method of claim 18, wherein at least one filtering mechanism selected from the group consisting of a filter and a trap is provided, to filter out undesired elements from water

collected in said lower tank, before said water is transferred into said upper tank.

24. The method of claim 18, wherein at least one filtering mechanism is provided, said mechanism selected from at least one of the group consisting of a filter and a trap.

25. The method of claim 24, wherein said filtering mechanism filters out undesired elements from water in said upper tank before said water flows into said water target.

26. The method of claim 18, further comprising providing at least one additional water inlet for said upper tank.

27. The method of claim 26, further comprising placing a one-way valve in said additional water inlet, thereby preventing flow of collected gray water from said upper tank through said additional water inlet to a fresh water source.

28. The method of claim 18, further comprising connecting said at least one water target to said upper tank, said connecting being implemented using piping and at least one low pressure supply valve.

29. The method of claim 28, further comprising connecting a shut-off valve to said piping, to shut off said upper tank from said at least one water target.

30. A low pressure plumbing system comprising:

an inlet pipe to transfer water from a gray water collection tank into a flush tank;

a low pressure valve, with substantially similar internal thickness

as said inlet pipe, said valve being connected between said inlet pipe and said flush tank; and

at least one connector, with substantially similar internal thickness as said-low pressure valve, to connect said low pressure valve to a filler tube in said flush tank.

31. A method for recycling gray water, comprising:

collecting gray water from at least one selected gray water source in a lower tank, said lower tank being situated at an altitude lower than at least one gray water source;

pumping collected gray water from said lower tank to an upper tank, said upper tank being situated at an altitude higher than at least one water target;

when said at least one water target requires a water supply, releasing gray water from said upper tank to said at least one water target.

32. The method of claim 31, further comprising adding fresh water to said upper tank from a fresh water inlet, when gray water level in said upper tank is below a determined level.

33. The method of claim 31, wherein said at least one water source is at least one source selected from the group consisting of washing machines, dish washers, basins, sinks, showers, bath tubs and air conditioning units.

34. The method of claim 31, wherein said at least one water target is at least one target selected from the group consisting of flush

tanks, gardens, fields, drainage systems, cleaning apparatus, and black water apparatus.

35. The system according to any of claims 1 – 17, 30 substantially as described hereinabove.

36. The system according to any of claims 1 – 17, 30 substantially as illustrated in any of the drawings.

37. The method according to any of claims 18 –29, 31-34 substantially as described hereinabove.

38. The method according to any of claims 18 –29, 31-34 substantially as illustrated in any of the drawings.

For the Applicant

Eitan, Pearl, Latzer & Cohen-Zedek
Lawyers, Patent Attorneys & Notaries
P5616IL

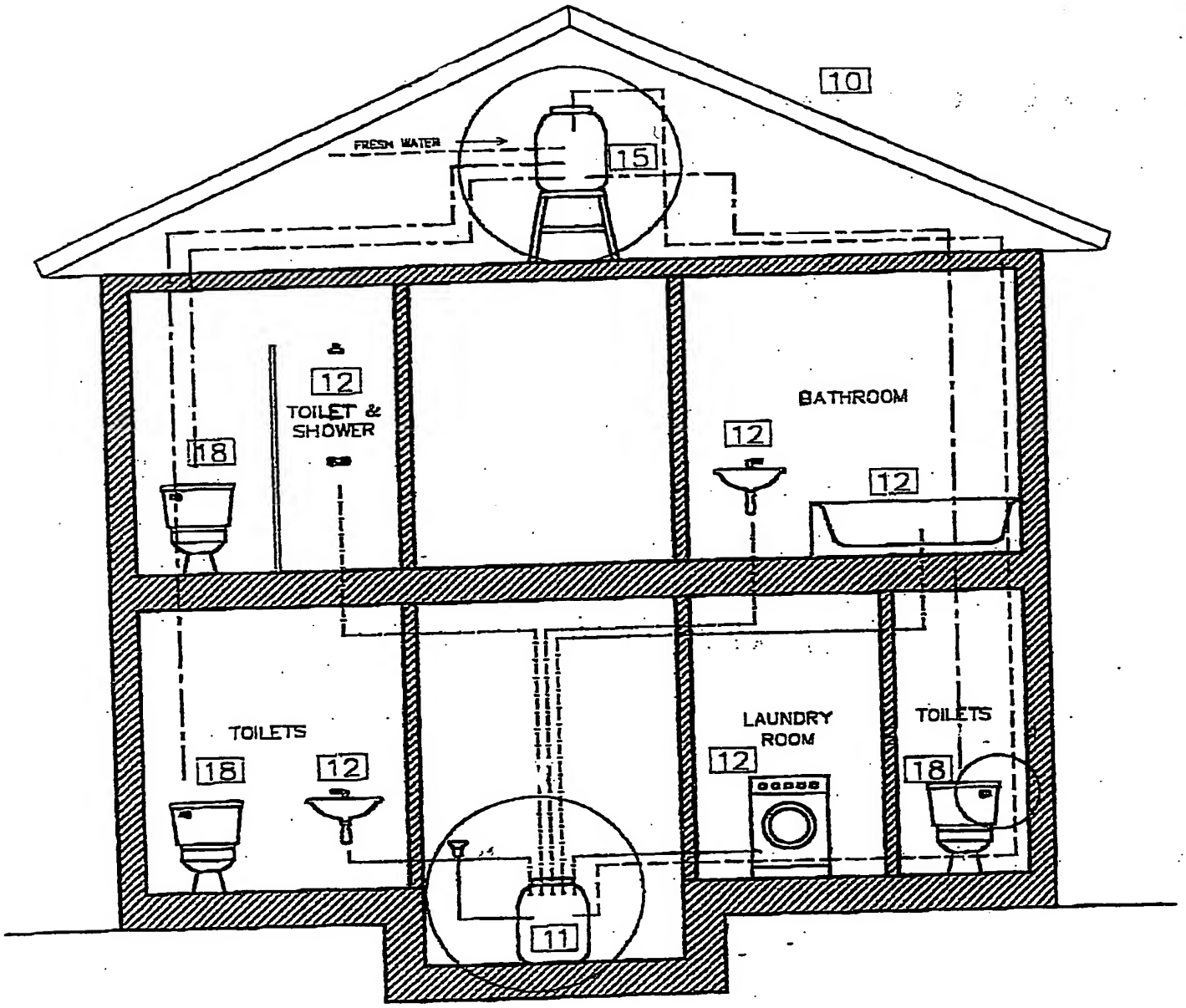


FIG. 1

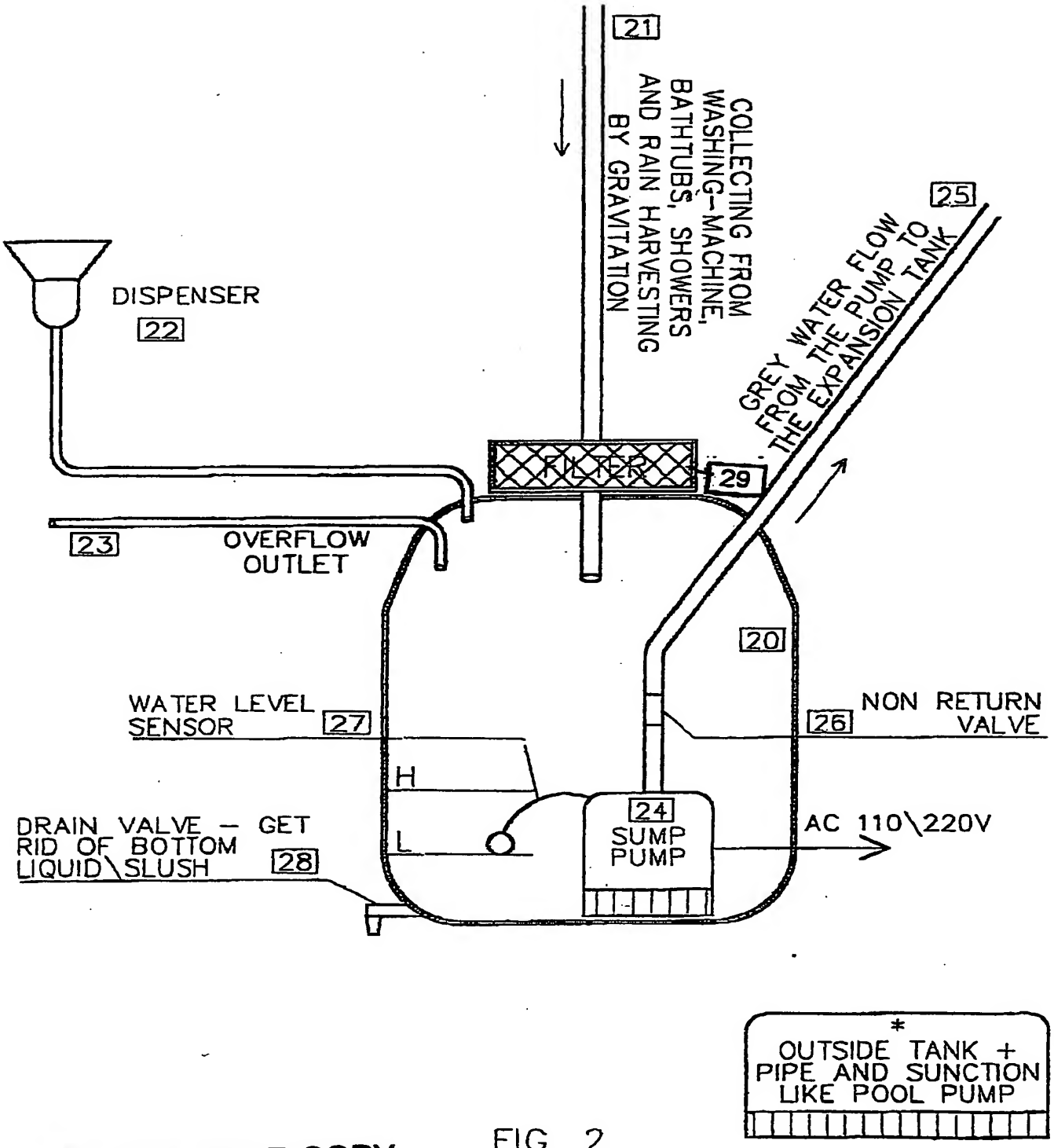


FIG. 2

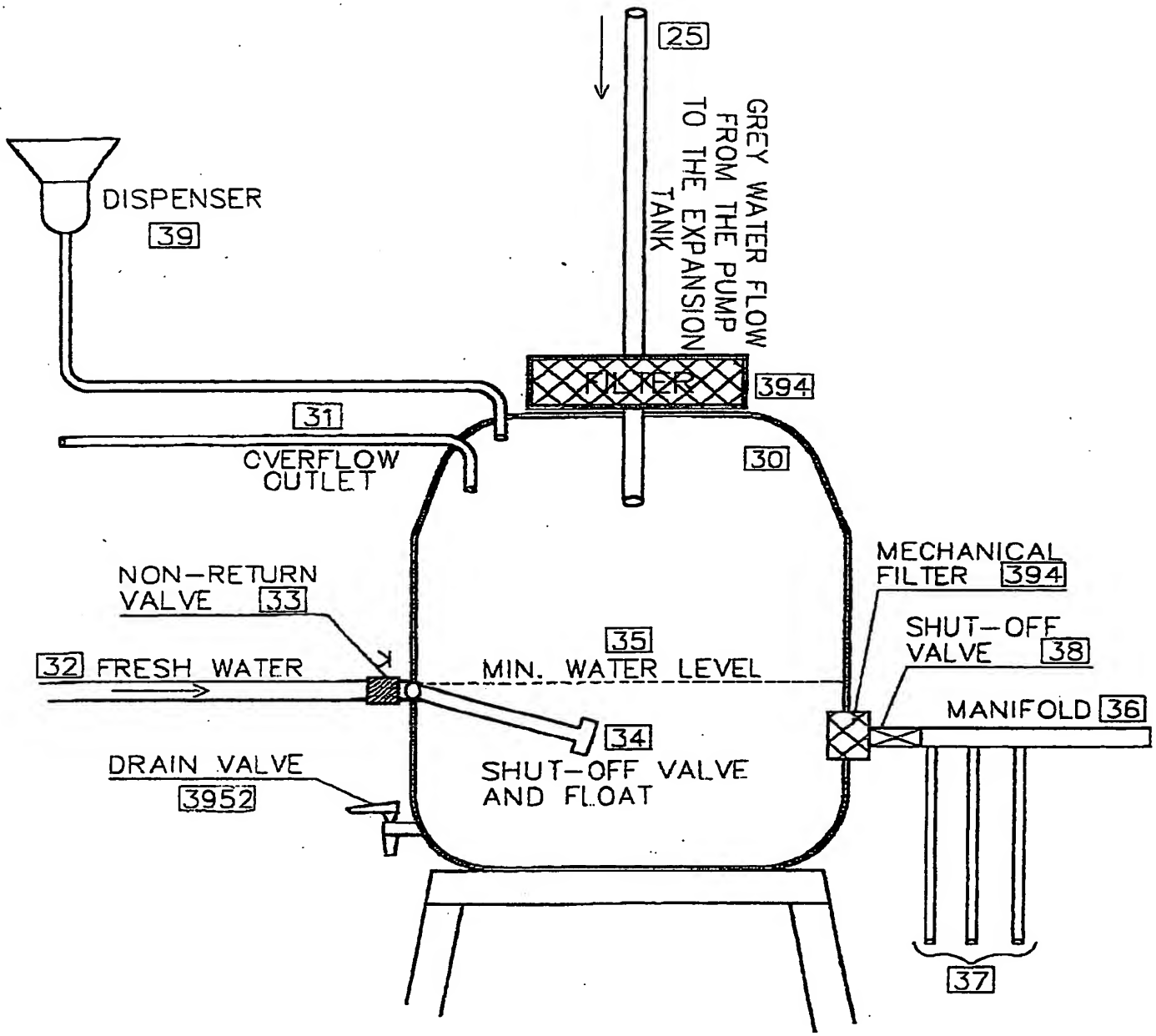
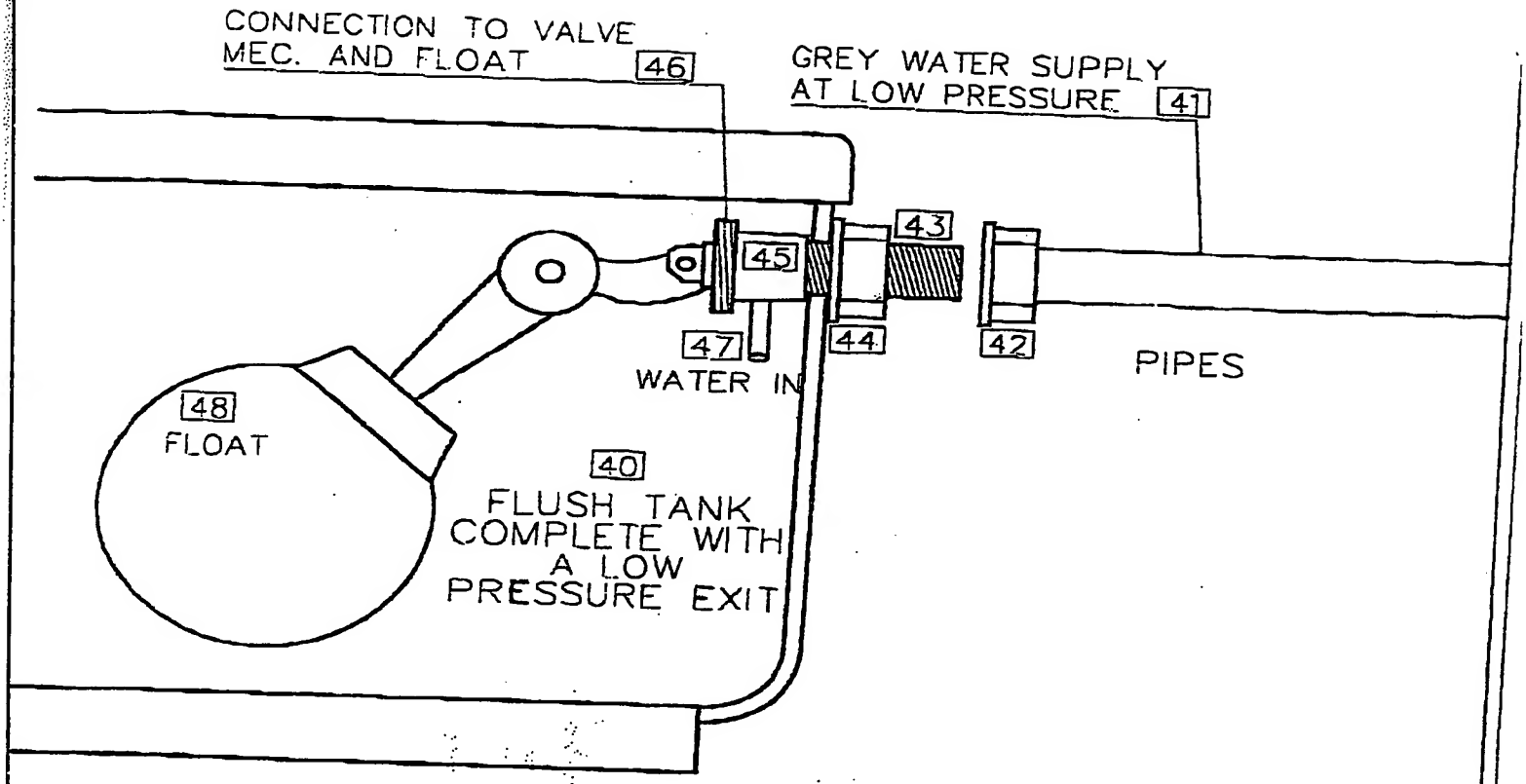


FIG. 3



- CORE OF FLOAT VALVE – CONNECTED TO VALVE
- KEEP ALL ELEMENTS 3\8 OR 1\2 AS MINIMUM DIAMETER OF INFLOW

FIG. 4